

Original Article

Analysis of technical and tactical principles in women's soccer

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Abstract:

The aim of this article is to analyze the technical and tactical aspects observed during 30 first division women's soccer matches in the Iberdrola league 2016-2017 season. An observational analysis of the technical and tactical principles was carried out using the Longomatch programme with a template of corresponding categories. During this study a total of 18523 actions were registered of which 16535 (89.26%) were technical actions and 1988 (10.74%) were tactical. The most frequently realised technical actions were passing and ball control. The least frequent were balls skills and feints. When the number of technical actions realised in the first and second half of the match are compared, significant differences in the players taking possession ($p=0.032$) are found. In the case of tactical actions, the most common were interception and attack followed by support and losing one's marker. The least frequent were defensive splitting and the one-two. A significant difference was found in the tactical action of losing one's marker between periods of the game ($p=0.044$). This investigation can be used by coaches to learn what technical and tactical aspects are the most used in matches and therefore plan their training sessions according to the demands of competition.

Key words: observational methodology, technical actions, tactical actions, women's soccer, longoMatch.

Introduction

According to García (2013) women's soccer is becoming more widely established and therefore the players need to better their performance and results. The development of this sport can be seen by the increase in the number of federative memberships, in the economic endorsement by clubs opting for a female section and that of sponsors.

There are a number of studies on the physical and physiological demands on the players. However there are very few that investigate the technical and tactical aspects of the game. A clear example of the aforementioned is the study completed by Bingham (2015) in which the impact of the performance demand during training is analyzed on the key variables of physical performance for the following match. We find others, like those of Gómez and Barriopedro (2005) that analyze the physiological demand on second division players, or that of Arecheta (2006) which measures the VO_{2max} in first division players. However there are few investigations of observational analysis in women's soccer competitions. "The observational methodology consists in a scientific procedure that, according to the stipulated objectives highlights the occurrence of perceptible behaviours so that they can be registered in an organized manner using the adequate parameters through an instrument made specifically for this purpose", according to Anguera & Hernández (2013).

Anguera & Hernández (2013) show that there are two strands in this type of methodology. The first strand is procedural, where data is collected in a direct way and in different phases in which we find: an outline of the problem and a design observation proposal; data collection, management and optimization; data analysis as well as the interpretation of the results. According to Anguera, Blanco, Viseñor and Losada (2011) the basic structures in observational methodology, highlight the proposal of observational designs, achieving a structuring of all the situations that could occur. In this sense the observational design is understood as a device or flexible guide that aids us in the chain of decisions to be made during the course of the empirical observational study, always subordinate to the outline of objectives that correspond to the acquisition, handling and analysing of the data.

The classic structure of observational design (Anguera et al, 2011) is based on three key criteria: units of study, the temporary nature and scope of study. Observational methodology has undergone various changes in the last decade and in the present day. From the procedural strand there has been a lot of work carried out so that this type of methodology is consolidated as a scientific discipline to enable changes in several aspects as is shown by Anguera and Hernández (2013), and Carbonell-Martínez and Jiménez-Olmedo (2017). While informative elements of perceptible character remain, it will be possible to undertake studies through observational methodology proposing an ideal observational design. Due to this, the study and analysis of any behaviour whether in training or competition will be feasible.

To undertake the registering of all the data and as a consequence of an observational analysis of the aspects of performance we find the analysis to be notational. According to Hughes and Franks (2004) this analysis is a way of objectively recording performance, so that the adequate elements of performance are quantifiable in a consistent and valid way. The technical and tactical actions are aspects that need to be observed and evaluated through a technique of notational analysis. According to Hughes and Franks (2004) this analysis allows soccer coaches to objectively see the results presented by their team during training and therefore allow them to visualize the technical-tactical performance of their players and through this improve the principles that the coach considers to be of use.

The aim of this article is to analyze the technical and tactical aspects that occurred during the observation of 30 matches of first division women's soccer during the 2016-2017 Iberdrola league.

Methods

Sample

In this study 30, first division women's soccer matches, from the Iberdrola 2016-2017 league where picked at random and analysed. A total of 300 players participated aged between 15 & 30 approximately with an average experience of 7.8 ± 1.6 years playing soccer. Before the start of the matches, each team performed a warm-up of about 30 minutes, basing their exercises on joint movement and technical aspects of ball control. Every team trained a minimum of 4 times per week with sessions of two hours in length excluding in this count the match corresponding to a weekend. Some of these teams played matches up to twice a week due to adjustments to timetables in international competitions. The length of the matches in the highest national category of women's soccer is of 90 minutes, divided into two halves of 45 minutes each with a break of 15 minutes between them. The matches in this category were undertaken on soccer pitches both of natural and artificial grass. Eleven players were used per team adding to this number the seven players on the bench with whom up to four changes could be made. To be able to analyse women's soccer with greater ease a descriptive quantifying observational analysis was undertaken for which a series of categories have been created to refer to the division and analysis of technical and tactical aspects.

Instruments and data collection

The registration instruments are "those that enable the gathering and treatment of the defined categories in the observation instruments" (García, 2010).

The analysis of the quality of the data has basically been through the use of notational video analysis software LongoMatch for Windows 8 v.0.20.7. It is a programme which includes a template manager for categories which allows us to create and modify templates of up to 20 categories, into which the technical and tactical principles are introduced, establishing a name and colour that describes the corresponding category.

Categories analysed

In this study an analysis of technical and tactical principles is undertaken, as Moreno (1996) pointed out in technical principles we can differentiate the individual techniques and the collective techniques. The former are all those actions that a player is capable of developing, mastering and playing the ball in their favour and finishing a play without the interception of other team members (control, skill, guiding, kicking, heading, dribbling, shooting, interception and tackling). The second corresponds to all those actions that unite two or more players of a team to the benefit of the team through successful execution of a play (Moreno, 1996).

In table 1 the categories of technical principles observed during matches and analysed in this investigation are defined.

Table 1. Categories of basic techniques (Moreno, 1996).

Basic techniques	Definition
Ball control	To gain possession of the ball and leave it in a position and adequate conditions to be played immediately with a subsequent action.
Skill	The skill of controlling the ball in the air through two or more contacts.
To run with the ball	Action performed by the player when she is able to control and manages the rolling of the ball on the pitch, keeping it safe from the opposition.
Kick	All intensity contact with the ball without a determined objective. When a player comes in contact with the ball they rid themselves of it by kicking it: smoothly (to guide or pass it) or intensely (to clear it).
To Head	All contact with the ball whether violently or gently with the player's head. Without a determined objective.
To Dribble	The action that allows us to advance with the ball, without losing it and overcoming the opposition preventing their interception in the play.

Shoot	All technical action that aims the ball towards the opposition's goal post.
Interception	The defensive move through which the trajectory of the ball, that has been touched by the opposition, is modified avoiding or not the intended end by it's shooter
Tackle	Is the physical technical action whose objective is to meet the opposing player that is in possession of the ball, with the end of impeding her progress or her ownership of the play.
Pass	The technical action that establishes a relationship between two or more members of a team. It's the beginning of a collective play.
Player Feint	A movement of the body with or without the ball with the objective of deceiving the opponent. Therefore we will define as feint certain moves or actions done by the player with the intention of deceiving, confusing or distracting the opposing player from the actual play intended. This can be done with or without the ball.
Take over possession	A collective tactical technique between two members of a team, in possession of the ball, and continuing the initiative of the play.
Stop the ball	The most convenient way to use all parts of the body to dominate or divert the ball and efficiently perform the actions that are required by each position.

With regard to tactical principles, Moreno (1996) said that they are all those actions of attack or defence which can be realise to surprise or counter the adversaries while the ball is in play during the match. We can differentiate on the one hand the offensive tactics, which are all those tactical actions and strategies that a team can develop while they are in possession of the ball (attack, loss of marker, counterattack, offensive splitting, player support and one-two) on the other hand you have the defensive tactics, which are the actions and strategies that can be developed when a team is not in possession of the ball (tactical retreat, tactical coverage, exchange, defensive splitting, interception and pressing). In table 2 the tactical principle categories are defined.

Table 2. Categories of basic tactics (Moreno, 1996).

Basic tactics	Definition
Attack	To try to reach the opposition's goal post with the ball, once it has been put into play or regained. It requires the action of the entire team.
Loss of the marker	To escape the opposing player once one's team has recovered possession of the ball. Therefore it's the responding action of all players that occupy a free space when a team member gains possession of the ball.
Counterattack	To steal the ball from the opposition and try to reach their goal post quickly, surprising them so that they do not have time to fall back or reorganise themselves defensively. Making use of the spaces that were freed up when advancing. This requires the action of few elements
Offensive player Split	Actions that impede the loss of advantageous positioning when attacks or counter attacks occur by the team that is in possession of the ball, by covering or occupying the offensive teammates back.
Player Support	To get closer or further away (without obstacles) of the player in possession of the ball, it can be sideways, diagonally, by going deep, from behind or from in front .
One-two	It is the fast receiving and delivering of the ball between two or more players, using one contact and overcoming at least one adversary.
Tactical retreat	The movements of retreat that players of a team who during their offensive action have lost possession of the ball, return to their zones or missions set by the coach as fast as possible, with the objective of organising their defence in the most effective way possible.
Tactical coverage	To be in a position to aid to a teammate who could be overcome by the adversary.
Exchange	When a player has lost possession quickly tries to take the place left by their teammate, who has advanced to meet the adversary.
Defensive player Split	A series of actions that avoid the loss of the advantage in position, covering the offensive teammate's back when she loses the ball and returning to occupy the place of the teammate that helped them.
Interception	The action that the defensive player takes to impede a ball shot by the adversary from reaching its destination, by changing or cutting short it's trajectory.
Pressing	Pressing is a collective defence tactic, which is undertaken when possession has been lost. Where by several or all of the teammates advance on various or all of the adversaries leaving them with no freedom of action and therefore attempting to break into the relevant offensive zone of the opposing team.

Procedure

To begin the 30 matches of first division women's soccer during the 2016-2017 Iberdrola league were filmed. Then the observation phase was undertaken with an initial viewing of the matches were first the technical and then the tactical aspects were analysed. In this steps of observational analysis the software for analysis of video LongoMatch v.0.20.7. was implemented to analyze the various actions undertaken during the encounters. In this study two templates of different categories were created. One that corresponds to the technical principles and the other to the tactical.

Statistical analysis

The data is presented as totals, percentages, mean values and standard deviation (mean \pm ds). The mean values for the number of technical and tactical actions between the first and second halves of the match are compared using paired t-tests taking as significant values $p < .05$. To register the data Microsoft Office Excel-2010 was used, whereas all the statistical analysis was done with the statistical pack SPSS 23.0 for Windows.

Results

In this section the results of the technical and tactical actions undertaken during a match are shown, we will later analyze the results of the technical and tactical aspects during the first half and second half of the match separately. The total number of actions in 30 matches analysed were 18523 from which 16535 (89.26% of the total) correspond to technical principles and 1988 (10.74% of the total) to tactical principles. In table 3 the technical and tactical principles are arranged according to the number of actions that occurred in women's soccer competition matches.

Table 3. Technical and tactical principles made during women's soccer competition matches.

The basic techniques	N°. Actions and percentages (%)	The basic tactical	N°. Actions and percentages (%)
1°- Passing the ball	7207 (43.6%)	1° - Interception	502 (25.3%)
2°- Controlling the ball	4805 (29.1%)	2°- Attack	454 (22.8%)
3°- Kicking	1042 (6.3%)	3°- Player support	192 (9.7%)
4°- Running with the ball	1034 (6.3%)	4°- Losing one's marker	181 (9.1%)
5°- Heading	768 (4.6%)	5°- Tactical coverage	135 (6.8%)
6°- Interception	673 (4.1%)	6°- Tactical retreat	134 (6.7%)
7°- Dribbling	355 (2.2%)	7°- Pressing	125 (6.3%)
8°- Shooting	270 (1.6%)	8°- Counterattack	71 (3.6%)
9°- Stopping the ball	153 (0.9%)	9°- Exchange	59 (3.0%)
10°- Tackling	133 (0.8%)	10°- Offensive player split	56 (2.8%)
11°- Skill with the ball	45 (0.3%)	11°- One-two	54 (2.7%)
12°- Feint	32 (0.2%)	12°- Defensive player split	25 (1.3%)
13°- Taking over possession	18 (0.1%)		

Analysis of technical principles

In relation to the results of the technical tactical analysis table 4 shows that the totals of actions were 16535. The action that is most common during matches is the pass with a percentage of 43.6 % (7207 passes) followed by controlling the ball with a percentage of 29.1% (4805 controls of the ball). The actions that happened the least during the encounters were skills with the ball with a 0.3 % (45 shows of skill with the ball) of the total, feint with a 0.2% (32 feints) and lastly taking over possession with just a 0.1 % (18 instances). When analyzing the different actions occurring during the first and second half, one observes that the pass and control of the ball are the actions most frequently performed during matches, with a higher average during the first part than during the second half, although the difference is not significant. It is in the taking of possession where the most significant differences are found ($p=0.032$) between both halves, with more actions during the first half of the match than during the second half.

Table 4. Technical actions made in the matches analysed.

The basic techniques	N°. Actions	Percentages (%)	1st Half	2nd Half
1°- Passing the ball	7207	43.6	250.4 \pm 74.5	230.1 \pm 68.1
2°- Controlling the ball	4805	29.1	166.1 \pm 47.9	154.2 \pm 36.5
3°- Kicking	1042	6.3	34.3 \pm 11.9	35.2 \pm 14.3
4°- Running with the ball	1034	6.3	38.5 \pm 20.8	30.5 \pm 12.4
5°- Heading	768	4.6	25.6 \pm 12.1	25.6 \pm 8.3
6°-Intercepting	673	4.1	17.3 \pm 7.4	27.6 \pm 45.3
7°- Dribbling	355	2.2	11.5 \pm 6.8	12.2 \pm 6.3
8°- Shooting	270	1.6	8.4 \pm 3	9.6 \pm 2.6
9°-Stopping the ball	153	0.9	4.9 \pm 2.3	5.3 \pm 1.7
10°- Tackling	133	0.8	5.1 \pm 4.2	3.8 \pm 2.9
11°- Skill with the ball	45	0.3	1.6 \pm 1.2	1.4 \pm 1.6
12°- Player feint	32	0.2	1.1 \pm 1.2	1 \pm 0.9
13°-Taking possession	18	0.1	0.9 \pm 1*	0.3 \pm 0.6*

Note= The values are expressed as the mean \pm standard deviation.
 * Significant difference ($p = 0.032$) between the 1st and 2nd half.

Analysis of tactical principles

In table 5 we can see that the total number of tactical actions is 1988 with interception being the most frequent with a 25.3 % of the total (502 interceptions) followed by attack with a 22.8% (454 attacks), player support with a 9.7 % of the total (192 supports) and loss of one's marker with a 9.1% of the total (181 losses of marker). The actions that occurred the least were offensive splitting 2.8% (56 splits) the one-two with a 2.7% (54 one-tuos) and the defensive splitting with a 1.3% (25 splits). Comparing the actions in both halves of the match, interception presents a stronger percentage in the first half than in the second half and is the most used tactic overall. However the loss of one's marker is the only tactic in which significant differences between the first and second halves are found with a ($p=0.044$) difference between the two.

Table 5. Tactical actions made in the matches analysed

The basic tactical	Nº. Actions	Percentages (%)	1st Half	2nd Half
1º - Interception	502	25.3	17.3±7.4	16.2±5.7
2º- Attack	454	22.8	14.5±4.3	15.8±3.3
3º- Player support	192	9.7	6.6±3.2	6.2±2.6
4º- Loss of one's marker	181	9.1	5.3±1.6*	6.7±2.0*
5º- Tactical coverage	135	6.8	4.6±3.0	4.4±2.4
6º- Tactical retreat	134	6.7	4.7±1.7	4.2±1.4
7º- Pressing	125	6.3	4.1±2.0	4.2±1.9
8º- Counterattack	71	3.6	2.2±1.4	2.5±1.1
9º- Exchange	59	3.0	1.8±1.9	2.1±1.5
10º- Offensive player split	56	2.8	1.8±1.1	1.9±1.3
11º- One-two	54	2.7	1.9±1.9	1.7±1.7
12º- Defensive player split	25	1.3	0.7±0.8	1.0±1.4

Note= The values are expressed as the mean ± standard deviation.
 * Significant difference ($p = 0.044$) between the 1st and 2nd half.

Discussion

The aim of this study is to analyze the technical and tactical actions which occurred during 30 first division women's soccer matches in the Iberdrola league of 2016-2017.

This article is the first study in which the tactical and technical actions in women's first division soccer are analysed. However, there are studies such as those of Gómez & Barriopedro (2005) which study the physiological load that represents the efforts undertaken by players from the second division by measuring heart rate and levels of lactic acid. Another study by Arecheta, Gómez & Lucía (2006) determines the importance of maximum oxygen consumption (VO_{2max}) in a first division women's soccer team.

Barbero (2006) analysed through a kinetic method the profile of female players using GPS and performing a quantitative analysis of the movements undertaken by players from the children's category.

Comparing our results to other studies we find that the pass is also the most frequent technical principle used by players as shown by the results of Luhtanen (2004) where a high level player makes use of the tactical action of passing followed by ball control and guiding of the ball. Controlling the ball coincides in both studies as being the second most frequently implemented technique. In this sense we can see that the most developed technical principle is the pass. It has the highest average in all categories and the percentage increases according to the level of the category, due to the fact that the number of passes grow when talking about elite players were these techniques have been worked on during their entire soccer career.

Controlling the ball is the second most frequent technique in this study, and it could be because following a pass between two players, controlling the ball is a way of receiving the pass from your teammate to gain control of the game and continue the play more in a more secure way than if the pass was made at first touch. In this study the actions that least appears are skill, taking possession and feint. These actions are manifested very few times because they are not elements that are part of an attack and therefore do not lead to an opportunity to score.

According to Luhtanen (2004) winning teams need an average of 16-30 attacks and 7-10 shots at goal. These results are similar to those obtained in our study where we have an average of 14.5 attacks in the first half and 15.8 in the second half, falling within this average because it's the highest category in women's soccer were the teams can lay out tactical situations and style of play of the highest level. The numbers of shots at goal found in the study by Luhtanen (2004) are very similar to those found in our study with an average of 8.4 shots in the first half and 9.6 in the second half.

As cited previously studies analyzing the tactical and technical principles occurring in a women's soccer competition do not exist, therefore the comparison of the results are undertaken against men's soccer which has more studies on the subject. The results between both sexes can be seen to be influenced by physiological conditions that exist between men and women, this could lead to very different results.

In the technical analysis we find that the taking of possession presents a significant difference between the first and second half ($p=0.032$). This technical aspect is not common in the study done by Martínez, Liarte, Castillo, Armada, Martínez & Díaz (2003) and has a small percentage in matches. This coincides with the results

of our analysis, where the action occurred a 0.1% concretely 18 occurrences of taking of possession in 30 matches. The difference between both halves could be due to fatigue accumulated by players.

In the tactical analysis the most frequent actions were the interception and the loss of one's marker. These principles could be linked, for when an interception happens the control of the game is regained, and consequently the possibility of attacking opens or if it's performed in such a way that the other team hasn't regrouped a counterattack could occur widening the chances of scoring a goal.

The tactical actions manifested the least where defensive and offensive splitting. This could be because they are consequences of other actions, for example returning a pass to a teammate and at the first contact overcoming a rival, giving the pass to your teammate and losing the marker by going behind them, this entails a correct execution and a high ability in both players involved.

In this analysis the loss of one's marker presents the most significant difference between both halves of the game ($p=0.044$). This aspect increases in the second half because a tactical situation could develop if more attacks are needed and the spaces and possibilities of the game need to be larger, creating more fast vertical attacks that require more losses of one's marker creating more possibilities of a pass. In the second half fewer technical actions occur and this could be caused by fatigue. However tactical actions rise in this half to maintain the result or to try to make a comeback.

Nowadays the development in women's soccer is fast paced, proof of this is found in the quality of organised matches where mastery and execution of technical and tactical aspects are observed.

Conclusions

To conclude our study has obtained the following results:

- The most frequently occurring technical action in Spanish women's first division soccer matches was the pass followed by control of the ball, whereas the least used actions were skill, feint and relieving and taking possession. Significant differences between the first and second half were found in the technical action of taking possession ($p=0.032$).

- The tactical action most used was interception followed by attack, whereas the least used were offensive and defensive splitting and one-two. Significant differences of ($p=0.044$) between the first and second half were found in the tactical principle of loss of one's marker.

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